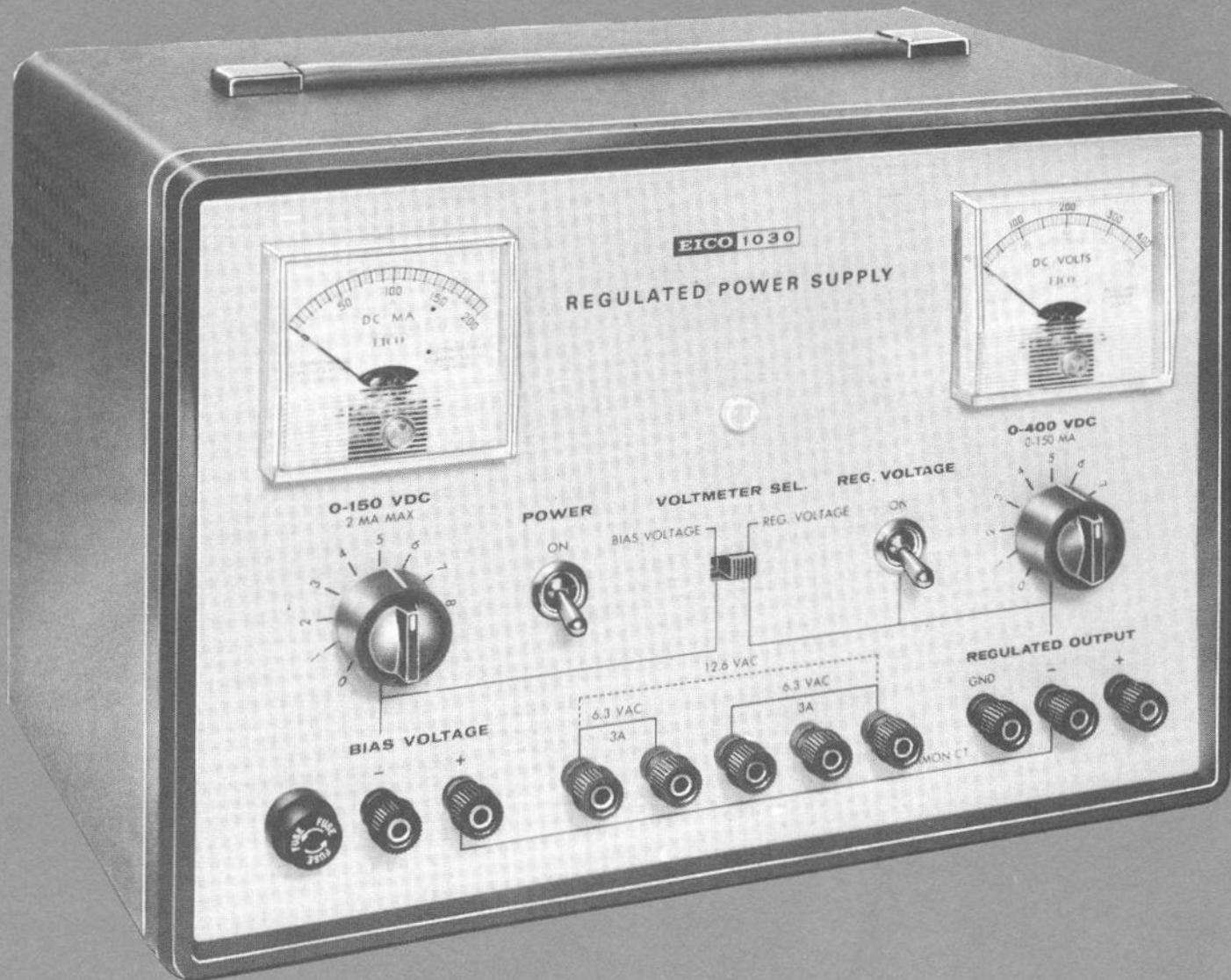


EICO

1030/Regulated Power Supply



OPERATING MANUAL

EICO

Electronic Instrument Co., Inc.

EICO SERVICE BULLETIN

ESB No. 70

December 10, 1965

TO: All EICO Service Agencies
FROM: Henry Berlin
SUBJECT: Addendum IE 1593 for Model 632

Subject addendum revises kit color coding as used in the most recent production run.

Please insert the addendum into your manual.

MODEL 632 ASSEMBLY MANUAL ADDENDA

In the 8-lead Cable Assembly, (Stock #86533), the red wire and the violet wire have been replaced by an orange wire and a white wire, respectively. Please make the following corrections to your Assembly Manual.

Page 13, Fig. 6, Step 2. Change the Second Line To:

"The Orange Lead to S4-2 (S1)". (Instead of Red lead).

Change the Third Line To:

"The White Lead to S4-4 (S3)." (Instead of Violet lead).

THE OTHER COLOR WIRES REMAIN THE SAME

In Figure 6 of the Construction Figures:

Change the Red Wire (to S4-2) to Orange.

Change the Violet Wire (To S4-4) to White.

GENERAL DESCRIPTION

A highly flexible and useful instrument, invaluable for testing, development and servicing. Incorporates a well-regulated B+ power supply, variable by a front panel control from 0 to 400VDC and monitored by a panel voltmeter. Load current is simultaneously monitored by a panel milliammeter. Also provides an independent regulated bias voltage supply, variable by another front panel control from 0 to -150VDC, again monitored by the panel voltmeter. Both supplies can be used simultaneously, with the voltmeter function selected by a front panel slide switch. In addition, two isolated 6.3VAC transformer windings are brought to the front panel, one center-tapped. Series connection of these windings provides 12.6VAC.

SPECIFICATIONS

REGULATED B+ POWER SUPPLY:

Voltage Range: 0 to 400VDC continuously variable

Current Range: 0 to 100ma continuous from 0-200VDC
0 to 125ma intermittent from 0-200VDC
0-150ma continuous from 200 to 400VDC

Load Regulation: varies less than 1/3% or 0.3V (whichever is greater) from 0 to 100ma

Line Regulation: varies less than 0.4% or 0.5V (whichever is greater) for $\pm 10\text{V}$ line variation

Ripple: less than 3mv rms

Output Impedance: less than 10 ohms from dc to 1mc

REGULATED BIAS VOLTAGE SUPPLY:

Voltage Range: 0 to -150VDC continuously variable

Current Range: 0 to 2ma

Line Regulation: varies less than 0.4% or 0.5V (whichever is greater) for $\pm 10\text{V}$ line variation

Ripple: less than 3mv rms

AC FILAMENT SUPPLIES:

6.3 volts AC at 3 amperes and 6.3 volts AC at 3 amperes, center-tapped

12.6 volts AC at 3 amperes by series connection of two 6.3 volt windings

6.3 volts AC at 6 amperes by parallel connection of two 6.3 volt windings

METERING:

Double-jewelled D'Arsonval voltmeter with switched ranges of 0-400 volts DC (Regulated B+ Supply) and 0-200 volts DC (Regulated Bias Supply)

Double-jewelled D'Arsonval milliammeter with 0-200ma scale for monitoring (Regulated B+ Supply)

POWER LINE REQUIREMENTS: 120 volts AC, 50/60 cycles; draws approximately 160 watts

SIZE (HWD): 8-1/2" x 12-1/2" x 9". WEIGHT: 21 lbs.

UNPACKING

This equipment has been thoroughly tested and inspected before packing. If you find visible damage upon unpacking, notify the dealer at once. If the unit was shipped to you from the dealer, you must file a claim with the carrier, since only you can recover for shipping damages. Your dealer and EICO will cooperate.

VENTILATION

Do not block the holes provided in the cabinet for circulation. Blocking these holes will cause an excessive temperature rise resulting in serious component damage.

CIRCUIT DESCRIPTION

REGULATED B+ POWER SUPPLY

The regulated 0 to 400 volt B+ power supply consists of full wave rectifier V1 and filter (operated from the 440-0-440 volt center-tapped winding of transformer T1); a series electronic regulator in the B+ lead consisting of parallel-connected tubes V2 and V3 and a regulator control tube V4; plus a final output filter. The center-tap of the 440-0-440 volt winding is both the negative return of the regulated B+ power supply and the positive return of the negative bias voltage supply.

Screen grid voltage for regulator tubes V2 and V3 is obtained from a separate half-wave rectifier supply consisting of CR1 and filter. V2 and V3 are operated as Class A amplifiers providing the total current drawn from the supply. In effect, these tubes behave as a variable resistance which changes with applied negative grid voltage (resistance increasing as control grid voltage is made more negative) obtained from the plate of control tube V4.

The grid of V4 is connected to the arm of REGULATED OUTPUT panel control R9 (0-400 volt range), which is part of a voltage divider running from the regulated B+ output lead (V2-V3 cathodes) to the full negative voltage end of the bias supply bleeder. This voltage divider consists of R10, R8, R9, R13 and R14. The bias supply bleeder network, R17 and R16, may also be considered part of the voltage divider in that it connects to the common return point for both supplies.

This voltage divider accomplishes a double purpose. It provides an adjustable range of negative grid bias for control tube V4, to permit control of the output voltage of the regulated B+ supply. It also allows any change of the output of the B+ supply, arising from any cause whatsoever, to appear as a proportional fractional change of the V4 bias. This change is amplified and applied in the opposite polarity to the V2-V3 control grids to oppose the variation and maintain a constant output voltage. The "0 CAL" internal adjust R8, and the "400V CAL" internal adjust R13, are inter-dependent adjustments that are set so that the range of the REGULATED OUTPUT control R9 is from 0 to 400 volts (read on the panel voltmeter).

The REG. VOLTAGE toggle switch S2 disconnects the 0-400 volt supply from the REG. OUTPUT terminals (and the milliammeter) at the OFF position to provide the convenience of standby operation. The VOLTMETER SEL. slide switch S3 connects the voltmeter, with appropriate multiplier R25 for the 0 to 400 volt range, across the 0 to 400 volt supply at the REG. VOLTAGE position.

REGULATED BIAS VOLTAGE SUPPLY

The regulated 0 to -150 volts bias voltage supply consist of half-wave rectifier V5, connected across the center-tap and one end of the 440-0-440 winding of transformer T1 used to operate the regulated B+ supply; a pi-type RC filter; VR glow tubes V6 and V7 connected in series across the output to provide voltage regulation; and BIAS VOLTAGE control R16 (on the panel) in a bleeder network. The BIAS VOLTAGE control R16 is used to set the desired negative bias voltage read on the 0 to 200 volt range of the voltmeter. The VOLTMETER SEL. slide switch S3 connects the voltmeter, with appropriate multiplier R15 for the 0-200 volt range, across the 0 to -150 volt supply at the BIAS VOLTAGE position.

AC FILAMENT VOLTAGE SUPPLIES

As described in the specifications.

OPERATION

WARNING

LETHAL HIGH VOLTAGES ARE PRESENT ON THE PANEL TERMINALS OF THIS EQUIPMENT. IN OPERATION, BE VERY CAREFUL TO AVOID CONTACT WITH THESE HIGH VOLTAGES. IN GENERAL, SET THE POWER SWITCH AT OFF FOR SAFETY WHILE CHANGING CONNECTIONS.

USING REGULATED B+ POWER SUPPLY

1. Set controls as follows: POWER switch to OFF, REG. VOLTAGE switch to OFF, REGULATED OUTPUT control to "0", VOLTMETER SEL. switch to REG. VOLTAGE.
2. Connect load across (+) and (-) REGULATED OUTPUT terminals. For B+ supply use, connect jumper between (-) and GND. terminals for minimum hum. For B- supply use, omit jumper.
3. Set POWER switch at ON and allow a minute or so for the equipment to warm up and reach a steady condition.
4. Set REG. VOLTAGE switch at ON and rotate REGULATED OUTPUT control clockwise until required operating voltage is read on the 0-400 volts dc voltmeter scale. Read load current on the 0-200ma dc milliammeter. Maximum load current is limited to 100ma for output voltage from 0 to 200 volts, or 150ma for output voltage from 200 to 400 volts. Up to 125ma load current is permissible in the 0 to 200 volt range if the use is not continuous.
5. Set both POWER and REG. VOLTAGE switches at OFF before removing or changing load connections, both to avoid shock hazard and the risk of accidentally shorting the supply terminals.

IMPORTANT

To simply disconnect the REGULATED OUTPUT terminals from the internal regulated supply for standby operation, set the REG. VOLTAGE switch at OFF. There will be no warm-up delay when the switch is returned to ON.

USING REGULATED BIAS VOLTAGE SUPPLY

1. Set controls as follows: POWER switch to OFF, BIAS VOLTAGE control to "0", VOLTMETER SEL. switch to BIAS VOLTAGE.
2. Connect a load that will not draw more than 2ma from the supply across the (+) and (-) BIAS VOLTAGE terminals. Note that the (+) BIAS VOLTAGE terminal and the (-) REGULATED OUTPUT terminal are both internally connected to the common return for both supplies, namely the center-tap of the high voltage transformer winding. The (+) BIAS VOLTAGE terminal is normally connected to chassis or B- of the equipment being operated. The (-) BIAS VOLTAGE terminal is connected to the point where it is desired to apply negative bias.
3. Set the POWER switch at ON, and allow a minute or so for the equipment to warm up and reach a steady condition.
4. Rotate the BIAS VOLTAGE control clockwise until the required bias voltage is read on the 0-200 volt dc voltmeter scale. Note that the current drawn from the bias supply is not indicated on the dc milliammeter.

5. Set the BIAS VOLTAGE control fully counter-clockwise to 0, and the POWER switch at OFF, before removing or changing load connections, both to avoid shock hazard and the risk of accidentally shorting the bias supply terminals.

USING THE FILAMENT SUPPLIES

1. Set the POWER switch at OFF, before making connections, to avoid the risk of accidentally shorting the filament supply terminals.

2. The two-terminal and three terminal 6.3VAC outputs are each rated at 3 amperes maximum and are taken from separate windings of the power transformer. The center terminal of the three-terminal set is the winding center-tap; 3.15VAC at 3 amperes maximum is available between this center-tap terminal and either of the adjacent terminals.

3. When 12.6VAC is required, strap the right terminal of the two-terminal 6.3VAC output to the left terminal of the three-terminal 6.3VAC output. When this is done, the outside terminals, linked by the dashed line on the panel, will provide 12.6VAC at 3 amperes maximum.

4. When 6.3VAC at 3 to 6 amperes is required, strap the left terminal of the two-terminal 6.3VAC output to the left terminal of the three-terminal 6.3VAC output; also, strap the right terminal of the two-terminal 6.3VAC output to the right terminal of the three-terminal 6.3VAC output. Each strapped pair of terminals now constitutes one terminal of a 6.3VAC source rated at 6 amperes maximum.

MAINTENANCE—GENERAL

Little service should be required except for normal tube replacement. Do not substitute for the tube types used. Factory-wired instruments have the internal 0 and 400 volt limit adjustments in the regulated B+ supply adjusted at the factory. Units built from the kit require these adjustments to be made as described below.

CABINET REMOVAL

To remove the instrument from the cabinet, first unplug the line cord, and then remove two #6 sheet metal screws at the rear. The instrument can be removed from the front of the cabinet.

WARNING

LETHAL HIGH VOLTAGES ARE PRESENT
WITHIN THIS EQUIPMENT. BE VERY CARE-
FUL TO AVOID CONTACT WITH THESE HIGH
VOLTAGES IF FOR ANY REASON THE EQUI-
PMENT IS OPERATED OUTSIDE OF ITS CABINET.

INTERNAL ADJUSTMENTS

The 0 to 400 volt range limits of the REGULATED OUTPUT control R9 on the panel must be set by adjustment of the "0 CAL" pot R8 and the "400V CAL" pot R13. R8 and R13 are accessible when the cabinet is removed and are located in Fig. 1.

For these adjustments, no other equipment is required and no connections are made to the panel terminals. The procedure must be performed exactly as given below, as otherwise there is danger of damaging filter capacitor C3 by application of excessive voltage.

1. Turn "0 CAL" pot R8 fully counter-clockwise.
2. Turn "400V CAL" pot R13 fully clockwise.
3. Plug line cord into 120 VAC line outlet.
4. Throw POWER and REG. VOLTAGE switches both to ON, and set VOLTMETER SEL switch at REG. VOLTAGE.
5. Allow equipment to warm up.
6. Turn REGULATED OUTPUT control R9 fully clockwise.
7. Turn "0 CAL" pot R8 clockwise until the meter reads exactly 400 volts (full scale)
8. Turn REGULATED OUTPUT control R9 fully counter-clockwise.
9. Turn "0 CAL" pot R8 counter-clockwise until meter reads exactly zero.
10. Turn REGULATED OUTPUT control R9 fully clockwise.
11. Turn "400V CAL" pot R13 until the meter reads exactly 400 volts (full scale). This completes the adjustments.

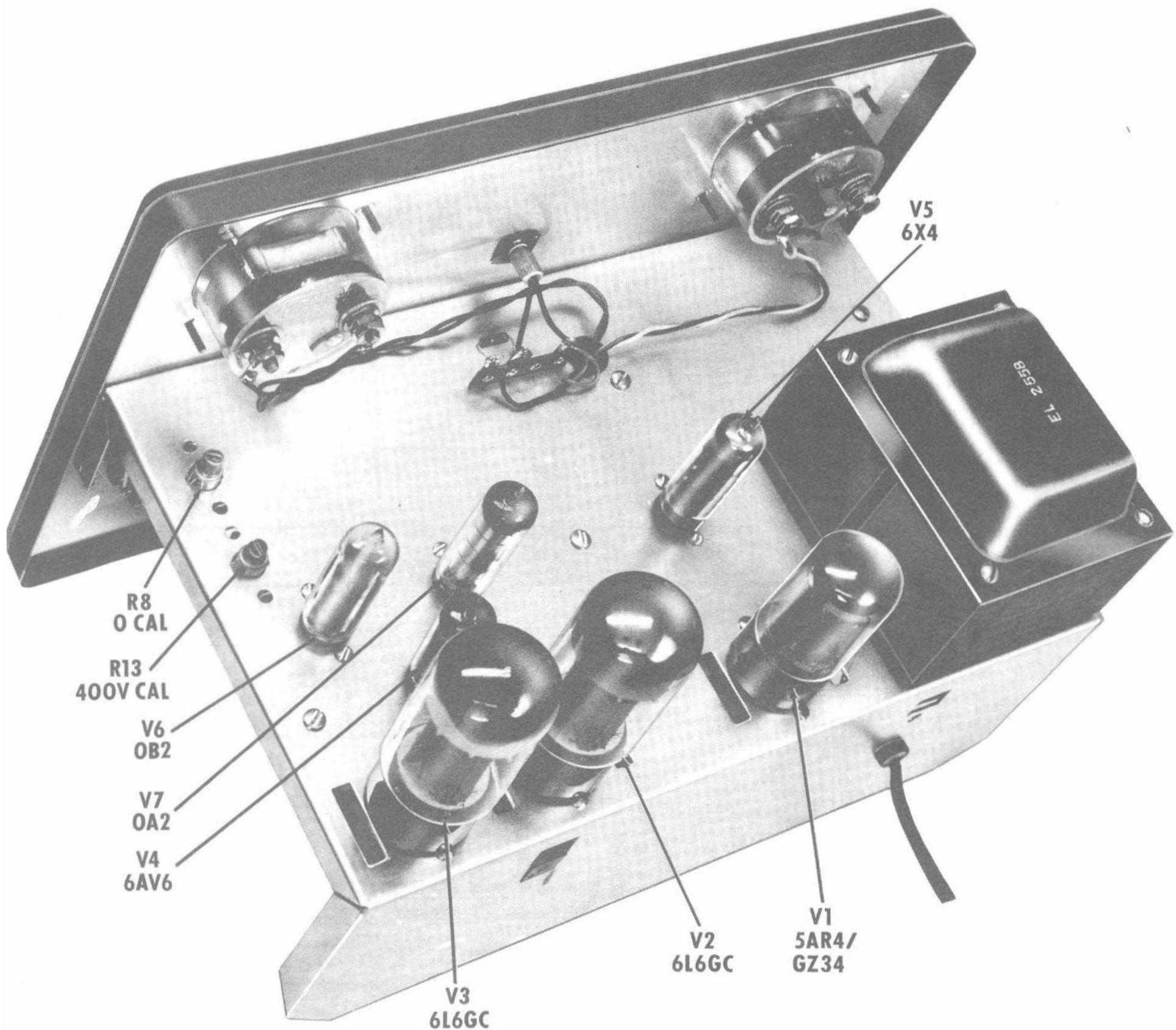


FIGURE 1

PRICE EACH	SYM. #	STOCK#	DESCRIPTION
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SWITCHES

1.02	S1, 2	61006	toggle switch, SPST	(2)
.45	S3	62028	slide switch; DPDT	(1)

METERS

14.60	M1	71009	ammeter, 0-200ma	(1)
14.60	M2	71010	voltmeter, 0-400V	(1)

TUBES & DIODES

3.44	V1	90044	tube, 5AR4/GZ34	(1)
4.32	V2, 3	90031	tube, 6L6GC	(2)
2.08	V4	90020	tube, 6AU6	(1)
3.08	V5	90070	tube, OB2	(1)
3.15	V6	90071	tube, OA2	(1)
1.72	V7	90036	tube, 6X4	(1)
3.80	CR1	93006	silicon diode, 800 PIV, 750ma	(1)

PRICE EACH	STOCK#	DESCRIPTION
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.01	42002	washer, lock, #6	(12)
.01	42007	washer, lock, #4	(10)
.01	42008	washer, lock, #8	(4)
.03	42029	washer, rubber, 1/2"	(1)
.01	42032	washer, flat, #8	(4)
.05	42043	washer, shoulder, bakelite, black	(3)
.02	42044	washer, bakelite, black	(7)
.04	42045	washer, brass, 1/8" thick	(1)
.04	42056	washer, shoulder, bakelite, gray	(5)
.01	42061	washer, flat, #8	(10)
.01	42062	washer, split, #8	(10)
.01	42508	washer, shoulder, bakelite, red	(2)
.04	42509	washer, bakelite, red	(2)
.02	42511	retainer for I1 (97715)	(1)
.02	43019	lug, ground, #8	(10)
.02	43003	lug, meter	(4)

MISCELLANEOUS

.03	46000	grommet, 3/8"	(1)
.08	46016	plastic feet	(4)
.53	53036	knob, gray	(2)
.54	57004	line cord, gray	(1)
5.85	80186	panel, decorative	(1)
5.25	81478	chassis	(1)
1.92	86007	frame	(1)
1.08	87007	handle	(1)
9.85	88124	cabinet	(1)
.10	82101	strain relief	(1)
.10	89679	handle mounting bracket	(2)
.20	89680	plate for 89679	(2)
1.50	66172	Operating Manual	(1)
1.50	66405	Assembly Manual	(1)
	89359	label, nomenclature	(1)

MISCELLANEOUS COMPONENTS & HARDWARE

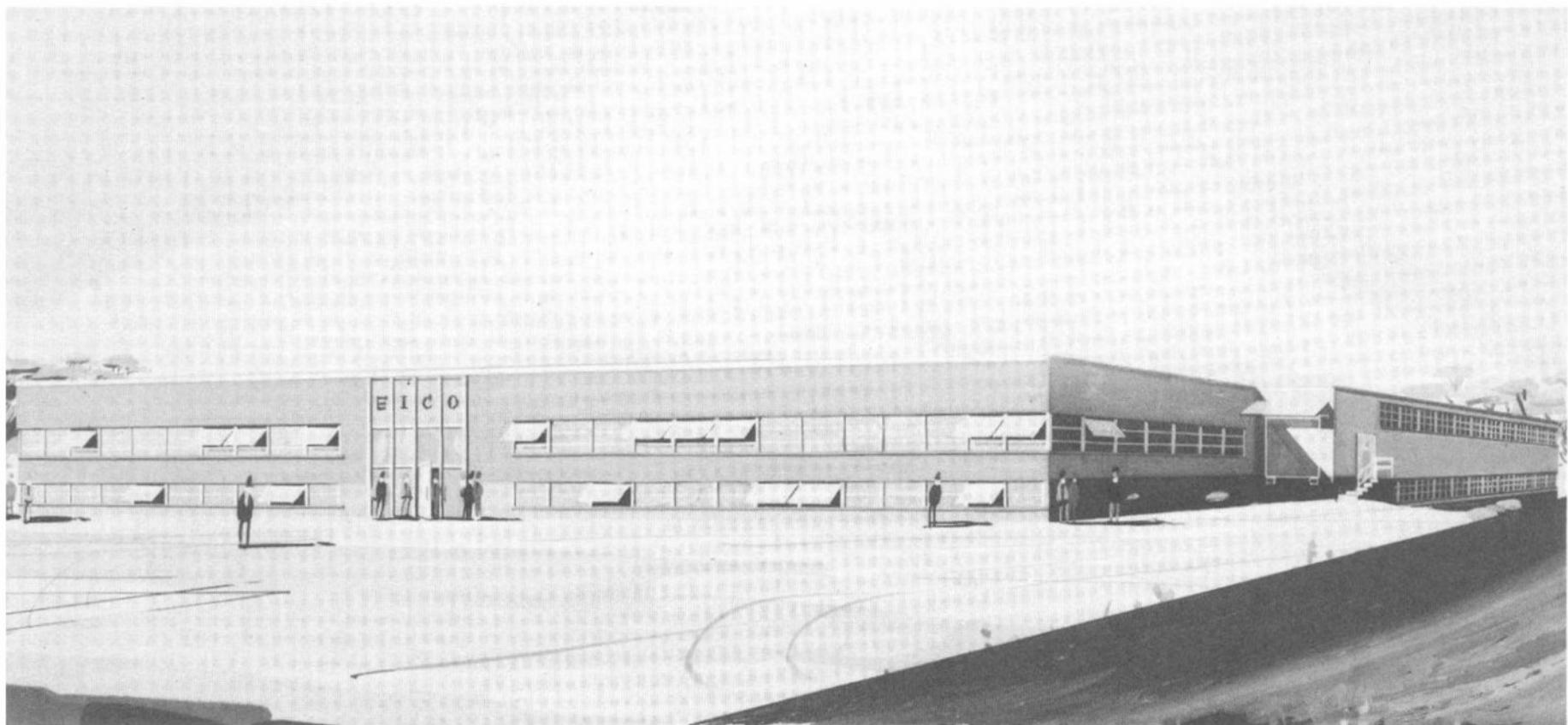
.01	40000	nut, hex, #6-32	(12)
.02	40001	nut, hex, #3/8-32	(2)
.01	40007	nut, hex, #4-40	(10)
.01	40008	nut, hex, #8-32	(4)
.07	40016	nut, hex, 1/2-24	(1)
.02	40045	nut, hex, #8-32	(20)
.01	40026	nut, #8 Tinnerman, Type J	(2)
.01	41000	screw, 6/32 x 1/4, B. H.	(12)
.01	41003	screw, 8/32 x 3/8, B. H.	(2)
.01	41016	screw, 4/40 x 1/4	(8)
.01	41091	screw, 4/40 x 1/4, F. H.	(2)
.02	41140	screw, 6/32 x 3/16, P. K., P. H.	(10)
.02	42000	washer, lock, 3/8"	(2)
.01	42001	washer, flat, 3/8"	(2)

To order replacement parts, specify description and part number. Remittance must be made with order, and include \$1.00 for mailing and handling with each order (\$1.50 for each transformer if order includes 1 or more output or power transformers). Prices subject to change without notice.

Since 1945, EICO has been recognized as a leader in the design and manufacture of electronic products in kit form. The wide range of equipment that EICO has made available covers nearly every phase of electronics—High Fidelity (Receivers, Amplifiers, Tuners and Speakers); tape recorders; test instruments, Citizen Band and Amateur Radio and Transistor Radios.

There is virtually no area of our every day life where EICO Products do not make a contribution. For there are more than 3,000,000 EICO Electronic Products in use in American homes, industry, military as well as in Federal, State and local Government. In the Nation's schools, EICO Test Instruments and training aids make it easier for students to learn about electricity and electronics.

EICO's 20 years of growth is a matter of public record. Responsible for this growth is the company's strict adherence to its policies of top quality products at reasonable prices. The Company's recent move to a modern 110,000 square foot plant marks the beginning of another era in EICO product development and contribution to the Nation's economy.



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